

CLAIMS

1. An apparatus for removing pollution from a substrate, said apparatus comprising:

5 a) a liquid discharging mechanism for discharging liquid into an open space;
and

 b) a gas discharging mechanism for discharging gas in a vicinity of said liquid in said open space to convert said liquid into liquid droplets and generate mixture of said gas and said liquid droplets,

10 said mixture of said gas and said liquid droplets being applied to a surface of a substrate to clean said surface of said substrate.

2. The apparatus in accordance with claim 1, wherein

 said liquid and said gas are collided with each other in said open space to
15 obtain said mixture of said gas and said liquid droplets.

3. The apparatus in accordance with claim 1, wherein

 said mixture is obtained by discharging one of said liquid and said gas into a jet flow of the other of said liquid and said gas.

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4. The apparatus in accordance with claim 1, wherein

 said liquid discharging mechanism has a liquid outlet through which said liquid is discharged,

 said gas discharging mechanism has a gas outlet through which said gas is
25 discharged, and

an angle between a center axis line of said liquid outlet and a center axis line of said gas outlet is not less than 0 degrees and not more than 110 degrees.

5 5. An apparatus for removing pollution from a substrate, said apparatus comprising:

a) first and second supply paths for supplying liquid and gas, respectively; and

b) a nozzle coupled to said first and second supply paths for mixing said liquid with said gas to obtain a cleaning fluid and applying said cleaning fluid onto a surface to said substrate, comprising

10 b-1) a liquid outlet through which said liquid is discharged in an open space, and

b-2) a gas outlet through which said gas is discharged into said liquid in said open space to convert said liquid into liquid droplets,

15 said cleaning fluid being mixture of said gas and said liquid droplets in said space.

6. The apparatus in accordance with claim 5, wherein

said liquid and said gas are collided with each other in said open space to obtain said mixture of said gas and said liquid droplets.

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7. The apparatus in accordance with claim 5, wherein

said mixture is obtained by discharging one of said liquid and said gas into a jet flow of the other of said liquid and said gas.

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8. The apparatus in accordance with claim 5, wherein

an angle between a center axis line of said liquid outlet and a center axis line of said gas outlet is not less than 0 degrees and not more than 110 degrees.

9. The apparatus in accordance with claim 5, further comprising:

5 c) a controller for controlling said first and second supply paths to start supply of said liquid after supply of said gas is started.

10. The apparatus in accordance with claim 9, wherein

said controller is operable to control said first and second supply paths to stop
10 supply of said liquid after supply of said gas is stopped.

11. An apparatus for removing pollution from a substrate, said apparatus comprising:

a) first and second supply paths for supplying liquid and gas, respectively; and

15 b) a nozzle structure, comprising:

b-1) a liquid nozzle for receiving said liquid to discharge liquid flow into an open space; and

b-2) a member surrounding said liquid nozzle such that a gas passage through which said gas passes is defined between said member and said fluid nozzle, gas flow
20 being discharged through said gas passage in a direction converging at a portion defined in said open space,

wherein said liquid flow is exposed to said gas flow in said open space to obtain gas-liquid mixture to be applied to said substrate.

25 12. The apparatus in accordance with claim 11, wherein

said member comprises an end portion having a conical concave facing said open space.